



Inside EPA article on ethanol and corrosion

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Interesting article. It seems that the amount of ethanol in the fuel was pretty low, lower than even 10%. You may have seen this already but in case not, FYI:

Tank Corrosion Study Heightens Debate Over Use Of Renewable Fuels

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A new study linking trace amounts of ethanol in ultra low sulfur diesel (ULSD) to corrosion in underground storage tanks (USTs) is heightening debate over the corrosive qualities of ethanol at a time when ethanol advocates are rallying to defend EPA's renewable fuels standard (RFS) against oil industry officials who are pushing to reform it.

Fears that higher blends of ethanol could increase UST leaks when fuel with 15 percent ethanol (E15) is introduced are among a series of issues critics of the RFS -- which sets fuel production goals for renewable fuels, such as corn ethanol -- have raised with legislators, saying EPA has not fully addressed the concern about UST leaks in its proposed overhaul of UST rules. The RFS program is also facing multiple attacks from critics due to alleged fraud in the renewable identification number credit trading program for the standard, and also rising corn prices due to both the drought and increased demand for corn to produce ethanol.

In early September, Battelle released a [diesel-industry funded study](#), "Corrosion in Systems Storing and Dispensing Ultra Low Sulfur Diesel (ULSD), Hypotheses Investigation," suggesting that although ethanol is not a component of diesel, it is finding its way into ULSD tanks through infrastructure shared with ethanol-blended gasoline such as tanker trucks or shared ventilation systems with USTs holding gasoline.

The study's release prompted a quick rebuttal from the Renewable Fuels Association (RFA), a trade group for the ethanol industry, which called the Battelle study another example of the oil industry's ongoing effort to show "ethanol as the culprit in a fuel with which it should never come into contact." RFA said presence of ethanol in diesel fuel suggests the diesel fuel system has been compromised with improper installation of the handling equipment or unacceptable handling practices, and criticized the study's finding for being based on limited data.

But the American Petroleum Institute (API) is defending the study's results, with an API official writing in a Sept. 14 blog post that Battelle was a third-party contractor that followed sound science and considered other possible factors for the corrosion besides ethanol.

"The ethanol industry no doubt has done significant research on bacteria [that can cause corrosion] and could actually help the problem by sharing more of what it knows with the

transportation fuel industry," Bob Greco wrote on API's Energy Tomorrow blog. "Instead, it points fingers at an industry that used more than 13 billion gallons of ethanol last year."

The debate over the study's findings follows concerns that tank owners and the oil industry raised earlier this year when they pushed for legislation to provide liability protections against engine damage caused by misfueling and against a possible increase in underground storage tank leaks. Although that effort stalled in Congress, some lawmakers who are critical of corn ethanol mandates are considering options for either dismantling or overhauling the RFS in the coming year.

The Battelle study, which found trace amounts of ethanol in corroded ULSD tanks and concluded the bacteria suspected of causing the corrosion feeds on low ethanol levels, says increased corrosion began appearing ULSD tanks in 2007, around the time of two major changes that affected the fuel industry.

The Clean Air Highway Diesel final rule set June 2006 as the start date for a 97 percent reduction in sulfur in diesel fuel in an effort to improve air quality. Around the same time, the Energy Policy Act of 2005 established the RFS, and later the Energy Independence and Security Act of 2007 mandated increased biofuels production.

'Severe And Rapid Corrosion'

Battelle investigated three possible explanations for the "severe and rapid corrosion" that has appeared in ULSD tanks and concluded that the corrosion is likely being caused by acetic acid, produced by the Acetobacter bacteria, which feed on low levels of ethanol. Scientists investigated six tanks, five with severe corrosion and a sixth, which was thought not to be corroded but was discovered to have slight corrosion. The study inspected the fuel, water bottoms, vapor, bottom sediments, and scrape samples from the tanks.

Battelle says ethanol was unexpectedly found at five of the six tank sites, and adds that while the specific source of ethanol is unknown, the ethanol could have entered diesel fuel and then tanks, because fuel transport trucks switch between carrying ethanol and non-ethanol containing fuels, so cross contamination of fuels and vapors is possible.

"Because nearly all the gasoline sold in the U.S. now contains 10 percent ethanol, it is not surprising that small amounts of ethanol were found in most of the diesel fuel and subsequent water bottom samples," the study says. The study also says ULSD tanks are often converted from gasoline tanks and that sometimes ventilation systems remain connected with other gasoline UST systems at a site.

Since the inspections were done at a limited number of sites, the study says, those sites might not be representative of all corroded ULSD tanks, and Battelle recommends further research into the causes of contamination, including an investigation with a larger and more diverse sample set.

The idea low ethanol levels lead to corrosion is something researchers suspected even before the

study, according to a scientist not involved in the study who has researched ethanol and corrosion. Corrosion associated with ethanol is suspected to be worse with smaller amounts than with fuels blended with 10 percent ethanol or higher, the source says, adding, "This is a problem where less is worse."

The source says the bacteria, which ferments into the acid suspected of causing the corrosion, needs water in the tank, separate from the fuel, and fuels with higher ethanol concentrations draw the excess water, which comes from condensation, into the fuel and reduces the corrosion risk. "If you get a little bit of water into an E10 tank it takes the water into the fuel," the source says. "E10 doesn't have the problem as bad, but it does have the problem."

The source adds that what is new in Battelle's study "is they've found the trace amounts of ethanol in the diesel fuel. It's gone from being speculation to a documented mechanism that would explain the corrosion that they're seeing."

The source also says it is possible that trace amounts of ethanol would appear in diesel fuel just as 20 years ago methyl tertiary butyl ether (MTBE) appeared in fuels in which it was not a constituent, like heating oil and jet fuel.

'Compromised' Fuel System

But in a Sept. 12 article, Kristy Moore, RFA's director of technical services, says that under normal everyday handling conditions ethanol should never come in contact with diesel. "The sheer presence of ethanol in diesel fuel suggests the diesel fuel system has been compromised with improper installation of the handling equipment or an unacceptable handling practice has taken place," she writes.

Moore also says that Battelle draws conclusions from limited data, and that "there are numerous plausible scenarios that can cause severe and rapid corrosion." Of those, Moore points to the Clean Air Highway Diesel final rule, EPA's effort to reduce emissions from diesel powered vehicles by reducing sulfur content in diesel fuel, which caused soot emissions that led to breathing difficulties, chest pain and coughing. Although the plan aimed to improve air quality, its effects on fuel were unknown, Moore writes, adding that sulfur provides fuel with natural lubrication, which helped prevent the growth of bacteria.

Additionally, Moore points out that ethanol has been a component of some gasoline since 1978, and that in states like Minnesota and Illinois, significant amounts of ethanol have been blended into gasoline for more than a decade. "If ethanol contamination were indeed the root cause of equipment corrosion that started appearing in 2007, then an epidemic of corrosion incidents would have plagued the storage and handling sectors since 2002 when ethanol replaced ground water contaminating MTBE as the oxygenate of choice by oil refiners," Moore says.

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